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THE EFFECTIVE TARGET OF THE SOCIAL SECURITY DISABILITY BENEFITS REFORM ACT OF 1984

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Abstract

A substantial portion of the rise in Social Security Disability Insurance rolls since 1984 has been attributed to the Social Security Disability Benefits Reform Act. Using data from the National Health Interview Survey, I examine whom the Act effectively targeted. The analysis shows that new enrollees were demonstrably taller than previous enrollees, suggesting that the Act expanded eligibility to individuals in better health and socioeconomic circumstances. However, the estimated effect of increased SSDI eligibility on employment is low, suggesting that the Act targeted males who would have otherwise been unemployed.

Key Words: Disability Insurance, Labor Supply

JEL Classification: J22, H55

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I. Introduction

The Social Security Disability Insurance (SSDI) program provides cash-transfers to individuals whose capacity for work is substantially limited. In 2008, the program provided $106 billion in benefits to 9.3 million disabled workers and their dependents. To target the work-disabled, the program requires potential beneficiaries to satisfy a set of medical criteria.[1] These criteria have changed since the program's inception to reflect working knowledge of functional limitations and health.

A major change to the program's medical eligibility criteria occurred in 1984 with the Social Security Disability Benefits Reform Act. The Act contained three particular amendments that likely expanded SSDI rolls. The first amendment relaxed the medical eligibility criteria by allowing claimants with multiple, non-severe disabilities to qualify for benefits; prior to the Act, a claimant must have had at least one severe medical impairment. The second amendment allowed pain associated with an identifiable medical condition to be considered in determining functional capacity. As a result, individuals with identifiable impairments causing pain, particularly musculoskeletal conditions, became newly eligible for benefits. The third amendment relaxed the eligibility criteria for mental illnesses by placing less weight on medical factors and more weight on functional factors. This statute increased the likelihood of an SSDI award, particularly for mental disorders other than "mental retardation".

By some accounts, the Act is responsible for much of the rise in SSDI rolls from 1984 to 2003 (Autor and Duggan, 2003; Autor and Duggan, 2006; Duggan and Imberman, 2008). Between these two years, the number of disabled-worker beneficiaries more than doubled from 2.60 million to 5.87 million, an increase of 126 percent. According to Duggan and Imberman

[1] The program also requires claimants to have a substantial work history. This requirement is discussed in detail in Duggan, Singleton, Song (2007) and elsewhere.

(2008), the rise in benefit receipt attributable to the Act can explain approximately 53 percent of growth among males and 38 percent of growth among females.

Despite the dramatic effect of the Act on disability receipt, few studies systematically examine whom the Act effectively targeted.[2] This study attempts to address this topic by simulating the population most likely affected by the policy. The main data source is the National Health Interview Survey, collected annually since 1957 to track health trends in the non-institutionalized, US population. For the current study, I use data years spanning 1983 to 1986 and 1992 to 1996 (hereafter, the former data period is referred to as 1983 and the latter as 1992, respectively). I restrict the empirical analysis to males since the Act had a larger impact on SSDI enrollment among them. SSDI receipt is not explicitly reported in these data, so I determine SSDI receipt by whether an individual is enrolled in Medicare.

Using NHIS data, I first demonstrate the degree to which Medicare receipt approximates SSDI receipt - the latter measured from administrative data - over time. I show that the rate of Medicare receipt among individuals with musculoskeletal conditions closely approximates levels and changes in the rate of SSDI receipt for this condition, but grossly underestimates SSDI receipt for mental illness. Therefore, for the empirical analysis, I focus on the rise in SSDI receipt for musculoskeletal conditions only.

I then examine the extent to which the rise in SSDI receipt for musculoskeletal conditions overstates or understates the likely impact of the policy. On one hand, SSDI receipt may overestimate the impact of the policy if new beneficiaries categorized as musculoskeletal after the Act would have, in the absence of the Act, been enrolled in SSDI and categorized as something else. On the other hand, the rate of SSDI receipt may actually underestimate the

[2] For a review of transfer programs targeted at the disabled, see Bound and Burkhauser (1999).

impact of the Act if individuals with multiple disabilities, including a musculoskeletal condition, became newly eligible as a result of the Act, but were not assigned as musculoskeletal. I show that growth in SSDI receipt for musculoskeletal conditions likely overstates the impact of the Act on receipt for older males and understates the impact for younger males.

I next infer the characteristics of males targeted by the Act by examining changes in demographic characteristics among Medicare enrollees over time. The most notable change among enrollees with a musculoskeletal condition is height: enrollees in 1992 were significantly taller than enrollees 1983. The increase in height cannot be explained by national trends or a general expansion in SSDI rolls over time. Since height is associated with health and socioeconomic factors (Case and Paxson 2008), the results suggest that, in comparison to previous enrollees, the Act targeted males who were in better health, better economic circumstances, or both.

If the Act is known to have targeted males of a certain height, then, under certain assumptions, the effect of expanded SSDI generosity on labor supply can be measured. In particular, the targeted height range of the Act can be used as instrument for SSDI receipt in 1992. Conditional on basic demographic information, instrumental variable estimates suggest that a one percentage point increase in SSDI enrollment increases labor force non-participation among males aged 30 to 49 by 2.5 percentage points (standard error: 0.37). The estimate is substantially larger than any estimate found by previous studies; at most, previous studies suggest a one-to-one relationship between SSDI receipt and nonparticipation.[3] Despite the large estimate on labor force participation, the effect of SSDI enrollment on employment is much

[3] Large labor disincentive effects of disability benefits are reported by Parsons (1980) and Slade (1984).

smaller: a one percentage point increase in SSDI receipt decreases the rate of employment by 0.68 percentage points (standard error: 0.37).

The estimates become demonstrably smaller, however, when the effect of demographic characteristics are allowed to vary with time. With this more flexible specification, the instrumental variable estimates for labor force non-participation and employment are 0.48 (standard error: 0.79) and -0.11 (standard error: 1.1), respectively. A full account of socioeconomic factors is not possible since the NHIS contains only basic demographic information, but the change in magnitude of the estimates to the inclusion of time-interacted, demographic controls suggests that the estimates serve as upper bounds of the true effect of SSDI on labor supply.

The employment estimate presented here is considerably lower than the highest, upper-bound estimate found in previous studies. In a seminal study, Bound (1989) measures the counterfactual, upper-bound level of employment among SSDI beneficiaries by the employment level of rejected SSDI applicants; the explicit assumption is that employment of accepted applicants can be no greater than employment of rejected applicants.[4] Using the Survey of Disability and Work, he finds that, among rejected male applicants aged 45 to 54, 36.7 percent were employed at time of the survey in 1972 and 48.9 percent were employed at the time of the survey in 1978; in other words, the effect of SSDI benefits on the rate of employment, at most, ranges from -0.37 to -0.49. Thus, relative to previous studies, this study provides a lower, upper-bound effect of SSDI on employment.

[4] Variations of this strategy have been employed in subsequent work by Bound, Burkhauser, and Nichols (2003), Chen and van der Klauww (2008), Maestas and Yin (2008), and von Wachter, Song, and Manchester (2009).

II. Aggregate Changes in SSDI Receipt

The potential impact of the Act on disability rolls can be measured summarily by changes in SSDI receipt rates over time. Aggregate rates of receipt among males in 1986 and 1993 are presented in the left panel of **Table 1**, and rates of receipt by diagnostic category are presented in the left panel of **Table 2.** The numerator - the number of SSDI beneficiaries - comes from Ferron (1995) who, using administrative data from the SSA, reports the total number of SSDI beneficiaries in December of 1986 and 1993; the denominator - the estimated population of males - comes from US Census data.

As shown in **Table 1**, the rate of SSDI receipt increases with age: in 1986, the rate increased from 1.27 percent among males aged 30 to 39 to 11.73 percent among males aged 60 to 64. The change in receipt from 1986 to 1993, however, is greater among younger males - among males aged 60 to 64, the rate actually declines by 0.11 percentage points.

Table 2 shows rates by diagnostic categories. The first three row sections - A, B, and C - correspond to musculoskeletal conditions, circulatory conditions, and mental illness, respectively. As shown, the change in receipt rate is greatest for musculoskeletal conditions and mental illness – the former more so than the latter - suggesting that the Act had a measurable effect on SSDI rolls. For musculoskeletal conditions, the level increase is greatest among the aged, but the relative increase is greatest among the young. A similar pattern is evident for mental illness. In contrast, the rate of receipt for circulatory conditions declined, particularly among the aged.

The relative increase in benefit receipt for musculoskeletal and mental illness suggests that the Act had a considerable impact on SSDI rolls. The implicit assumption of this interpretation is that the rate of receipt for these conditions would have remained relatively constant had the Act not been implemented.[5] Even with the stable-rate assumption, however, the change in benefit receipt may not accurately represent the effect of the Act. The ambiguity arises since the Act also granted benefits to individuals with multiple, non-severe disabilities. Thus, the first concern is that, following the Act, beneficiaries with multiple disabilities may have been categorized as musculoskeletal or mental illness, but, in the absence of the Act, would have been (or eventually would have been) awarded benefits and categorized as something else. If so, the aggregate change in SSDI receipt, particularly for musculoskeletal and mental illness, would overstate the true effect of the Act.

The second concern is that individuals with multiple disabilities, including a musculoskeletal condition, may have been awarded benefits as a result of the Act, but the musculoskeletal condition was never the main cause for the inability to work. If these individuals were awarded benefits but not categorized as musculoskeletal or mental illness, then the aggregate change in SSDI receipt for these conditions would understate the true effect of the Act.

III. Addressing the Limitations of Aggregate SSDI Data

A. Data

To address the limitations of aggregate SSDI rates, I use micro-level data from the National Health Interview Survey from 1983 to 1996. A major redesign to the NHIS survey in years 1982 and 1997 preclude a direct comparison of data across these years. Work-limited respondents designate one condition as the "main" cause of their disability, but can report as many additional conditions as applicable.

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[5] This assumption was used by Duggan and Imberman (2008), cited above, to measure the effect of the Act on SSDI receipt for mental illness and musculoskeletal conditions.

Unfortunately, the data do not contain precise information on SSDI receipt; but the health supplement to the NHIS does contain whether an individual is covered by Medicare. Since nearly all Medicare enrollees under the age of 65 are SSDI beneficiaries – beneficiaries become eligible for Medicare after two years of receiving SSDI benefits - Medicare coverage is a reasonable indicator of disability benefit receipt.[6] I must therefore restrict the analysis to survey years that contain the health insurance supplement - an add-on to the core data - which pertains to years 1983 to 1986 and 1992 to 1996. I define years 1983 to 1986 as the pre-reform period and 1992 to 1996 as the post-reform period.[7] Consistent with most studies in the literature, I focus the empirical analysis on males.

B. Aggregate Changes in Medicare Receipt

I first examine whether the rate of Medicare receipt estimated from the NHIS is a reasonable approximation to the rate of SDDI receipt measured from administrative data. Estimates of Medicare receipt are presented in the right panel of **Table 1**, and the rates of receipt by diagnostic categories are presented in the right panel of **Table 2.** [8]

According to **Table 1**, the estimated rate of Medicare receipt slightly underestimates the rate of SSDI receipt among all age categories, but appears to underestimate the rate by more among the older age categories. Among males aged 60 to 64, the rate of Medicare receipt in 1983 is approximately 1.74 percentage points less than SSDI receipt. The underestimates may

[6] Individuals with end-stage renal disease are also eligible for Medicare benefits before the age of 65.

[7] The NHIS samples vary considerably across years. To avoid arbitrarily overweighting smaller sample years using sample weights, I rescale the sample weights within survey year to sum to the sample size before any sample restrictions were made.

[8] A small number of observations do not report Medicare receipt status. These observations are dropped from the analysis. Additionally, a small number of observations report being work-limited, but do not report their disabling conditions. These observations are dropped from the sample to compute figures in **Table 2**.

reflect that Medicare coverage lags an SSDI award by two years; and since the growth in SSDI receipt increases with age, the underestimate would be greater at older ages. Although different in levels, the change in Medicare receipt from 1983 to 1992 is similar to the change in SSDI receipt across all ages.

In **Table 2**, I examine rates of Medicare receipt across diagnostic categories. Individuals are assigned to diagnostic categories by their reported, main disability. As shown, the level in Medicare receipt is similar to the level of SSDI receipt for musculoskeletal and circulatory conditions, but slightly underestimates circulatory conditions at older ages.

Rates of receipt for mental illness and “other” conditions are presented in row-sections C and D, respectively. As shown, Medicare receipt for mental illness systematically underestimates SSDI receipt, which may reflect that beneficiaries with mental illness are under the care of someone else or, since the NHIS represents the non-institutionalized population, are institutionalized. The estimates may also reflect stigma of reporting a mental illness. For “other” conditions, the rate of Medicare receipt is less than SSDI receipt, but the change Medicare receipt is comparable to the change in SSDI receipt.

C. Empirical Strategy

To address the limitations of SSDI data in measuring the effect of the Act, I examine the change in disabilities reported by Medicare enrollees who report having "any" musculoskeletal condition. The reason for considering any musculoskeletal condition - rather than a musculoskeletal condition as the main cause - stems from the limitations of aggregate measures of receipt described above. First, if the prevalence of main musculoskeletal conditions - reported in **Table 2** - increased by more than the prevalence of any musculoskeletal conditions, then the difference likely reflects categorical reassignment of beneficiaries who would have been awarded benefits in the absence of the Act, though categorized as non-musculoskeletal. And second, if the prevalence of main musculoskeletal conditions increased by less than the prevalence of any musculoskeletal conditions, the difference may reflect beneficiaries who became newly eligible for benefits after the Act, but were assigned to a non-musculoskeletal category.

The working assumption is that the number and composition of enrollees who report any musculoskeletal condition before and after the Act is a result of the Act itself. This assumption seems plausible since the share of new enrollees for musculoskeletal conditions appears stable shortly before the Act (Duggan and Imberman 2008).[9] The assumption also implies that the policy did not induce preexisting enrollees to report a musculoskeletal condition. This additional assumption also seems plausible since - having already been awarded benefits - previous beneficiaries have no obvious incentive to report a musculoskeletal condition in response to the Act.

D. Work-Limiting Disabilities

The rate of Medicare receipt among males who report any musculoskeletal condition, as well as the rate of those who report a musculoskeletal condition as the main cause, is reported in the top two row of **Table 3.** The figures in the first and second panels correspond to before and after the Act, respectively; and within each panel, the sample is disaggregated into four age categories. The rate of any musculoskeletal condition is greater than the rate of musculoskeletal conditions as the main cause since not all enrollees report the condition as their main disability.

[9] This assumption is also supported by Hotchkiss (2004) who reports that the rate of musculoskeletal conditions reported in the Survey of Income and Program Participation remained fairly constant from 1986 to 1997. One concern is that expanded benefit eligibility may encourage the detection of latent medical conditions and therefore the prevalence of disabilities (Kubik 1999, Singleton 2009), but this should not be a factor for musculoskeletal conditions causing pain.

As indicated, among the two oldest age categories, the prevalence of any musculoskeletal condition increased by less than the prevalence of musculoskeletal conditions as the main cause. The increase in the latter prevalence among males aged 60 to 64 was 0.50 percentage points (3.5 to 4.0), compared to the former of 0.64 percentage points (2.2 to 2.8). Thus, approximately 20 percent ((0.64-0.50)/.64) of the rise in SSDI receipt for musculoskeletal conditions may not actually represent new beneficiaries, but beneficiaries who would have been assigned to a different category in the absence of the policy.

In contrast to the older age categories, the prevalence of any musculoskeletal condition among younger males increased by more than the prevalence of musculoskeletal conditions as the main cause. For males aged 30 to 39, the change in "main" and "any" was 0.11 and 0.14, respectively. This suggests that the aggregate change in SSDI receipt among the young may only reflect 80 percent of total increase due to the policy (0.11/0.14).

To which categories new, younger beneficiaries with musculoskeletal conditions are being assigned - and from which categories new, older beneficiaries are being alternatively assigned - can be determined by the change in proportions of beneficiaries by the “main” disability category. These proportions, reported as percents in **Table 3**, are computed for three categories: musculoskeletal, circulatory, and other. (For example, 70.4 percent of males aged 30 to 39 with any musculoskeletal condition in 1983 reported the condition as their main disability) The effect of reassignment on Medicare rolls can be measured by simulating the main-disability proportions among new beneficiaries only. To perform the simulation, I assume that the proportions of main disabilities in 1992 would have remained at their levels in 1983 absent the Act. If so, then the proportions among new enrollees can be derived from a simple weighted-average calculation, where the weights are determined by the prevalence of any musculoskeletal condition reported in the top row. For example, the prevalence among males aged 30 to 39 increased from 0.23 to 0.37 percent, implying that approximately one-third of beneficiaries in 1992 are new. If the previous two-thirds had not changed their reported main disability, then the proportion of new beneficiaries with any musculoskeletal condition who report the condition as the main cause must be 80.1 percent. The other 20 percent, as shown in the table, were assigned as "other", implying that the Act may be responsible for as much as one-half (0.22*.014/0.07) of the rise in beneficiaries assigned to the "other" category reported in **Table 2**.

The same simulation for the two oldest age categories yields unrealistic proportions, exceeding one for musculoskeletal and negative for circulatory and other. These proportions arise since the prevalence of those who report any musculoskeletal condition increased by less than the prevalence of those who report a musculoskeletal condition as the main cause. To correct this implausibility, I assign all new beneficiaries (0.40 and 0.50 percent of males aged 50 to 59 and 60 to 64, respectively) to the musculoskeletal category, and adjust the proportions for the circulatory and other categories to yield the observed proportions in 1992. This calculation, provided in **Appendix Table A**, suggests that 3.8 percent of new musculoskeletal enrollees aged 60 to 64 would have been assigned as circulatory in the absence of the policy. Thus, among males aged 60 to 64, the Act may be responsible for as much as 24 percent (0.038*4.0/0.52) of the decline in Medicare receipt for circulatory conditions.

IV. Effective Target Population

A. Demographic Characteristics

Similar to the analysis above, the demographics of the effective target of the Act can be inferred from changes in demographic characteristics among Medicare enrollees over time. If the characteristics of enrollees would have remained constant in the absence of the Act – an admittedly stronger assumption here than in the previous section – then the change in characteristics between 1983 and 1992 can be attributed to new enrollees as a result of the Act. In contrast to the previous section, where the population of interest was enrollees reporting any musculoskeletal condition, the current analysis focuses exclusively on enrollees who report a musculoskeletal condition as the main cause. To improve the precision of the estimates from this restricted sample, I pool observations into two age categories: 30 to 49 and 50 to 64.

Demographic changes are reported in **Table 4**. The first through fourth columns report average characteristics for each age and year category pairs, and the final two columns report the change in demographics between 1983 and 1992. As shown, the only statistically significant changes among enrollees are the likelihood of living in the Northeast (specifically among males aged 50 to 64) and height. On average, Medicare enrollees aged 30 to 49 and 50 to 64 were 2.8 centimeters and 1.7 centimeters taller, respectively, in 1992 compared to enrollees in 1983.

The estimates suggest that the Act effectively targeted those who were taller, on average, than previous enrollees. Previous studies show that adult height is strongly associated with height as a child, and child height in turn is determined by early-life nutrition and health (see Case and Paxson 2008). Since early-life nutrition and health may positively impact both health and economic outcomes in adulthood, the increased height of Medicare enrollees suggests that, in comparison to previous enrollees, the Act targeted individuals in better health, better economic circumstances, or both.

An alternative interpretation of the increase in height, however, is that the overall height of the population is increasing. To examine this possibility, I examine the increase in average height among enrollees relative to the national average. These estimates are reported in the top panel of **Table 5** using a difference-in-differences framework. As shown, in 1983, young males enrolled in Medicare were 3.72 centimeters shorter than the national average. But the increase in height among enrollees of 2.8 centimeters reduced this difference to a statistically insignificant 1.04 centimeters. The differential increase in height among young enrollees aged 30 to 49 relative to the national average is therefore 2.68 (standard error: 1.2). The same pattern is apparent for older males: the differential increase in height among enrollees aged 50 to 64 was 1.18 centimeters (standard error: 0.73). Thus, the increase in height among enrollees, particularly young enrollees, cannot be explained by national trends.

Another alternative interpretation is that the relative change in height is mechanically related to the overall expansion of the SSDI program. To examine this possibility, I estimate the average height of enrollees who report "other" as their main disability with no musculoskeletal conditions. These estimates, also compared to the national average, are reported in the bottom of **Table 5**. As shown, the differential rise in height among non-musculoskeletal enrollees was negligible and statistically insignificant. The results therefore suggest that the differential rise in height among enrollees for musculoskeletal conditions cannot be explained by a general expansion of the SSDI program.

B. Implications for Screening

The increase in height among enrollees with musculoskeletal conditions suggests that the Act targeted males who were taller than previous beneficiaries. A natural question is whether newly enrolled beneficiaries are, on average, shorter than those who claim to be unable to work because of a musculoskeletal condition, but who are not enrolled in Medicare in 1992.

To make this comparison, I simulate the height among new Medicare enrollees as a result of the Act. To account for the national, upward trend in height, I base the simulation on the following linear regression:

$$H_t = \alpha_0 + \alpha_1 P_t + \alpha_2 M + \alpha_3 P_t * M + \varepsilon_{it}.$$

H_t is height; P_t is a period indicator for years 1992 to 1996; and M is an indicator of Medicare receipt (individual subscripts are suppressed). The equation is estimated from the full sample of males so that α_1 reflects the national change in height, and the coefficient α_3 reflects the differential increase in height among enrollees. The estimated height of Medicare enrollees in the absence of the Act is given by:

$$\hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_2.$$

And the simulated height of new Medicare enrollees as a result of the Act is given by:

$$\frac{(\hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_2 + \hat{\alpha}_3) - S_p(\hat{\alpha}_0 + \hat{\alpha}_1 + \hat{\alpha}_2)}{S_{\boldsymbol{n}}}.$$

The term S_p and S_n represent the share of previous and new enrollees among all Medicare enrollees in 1992. These shares are implied by the prevalence estimates reported in the top row of **Table 4** and are assumed nonrandom.[10]

The predicted heights among previous enrollees, and the simulated heights among new enrollees, are reported in **Table 6**. As shown, new enrollees aged 30 to 49 are 4.3 centimeters (F-stat: 5.79) taller than previous enrollees. And new enrollees aged 50 to 64 were 2.53 centimeters taller, though the difference is not statistically significant (F-stat: 3.42).

I then compare the simulated heights among new enrollees to non-enrollees in 1992 who report being unable to work because of a musculoskeletal condition. These estimated heights are

[10] The nonrandom assumption seems reasonable since the estimated rates of Medicare receipt for musculoskeletal conditions closely approximate the rates of SSDI receipt (see **Table 2**).

reported in the far right panel of **Table 6**. As shown, new enrollees are actually taller than non-enrollees by about 1.5 centimeters, though neither difference for the two age categories is statistically significant. One concern for this direct comparison, however, is that individuals may have been induced to report a musculoskeletal condition in response to the policy.[11] If these induced responders are taller than new enrollees, on average, then the difference in height between new enrollees and non-induced responders would be underestimated. On the other hand, if induced responders are shorter than new enrollees, on average, then the difference in height would be overestimated.

To potentially address the concern for induced responders, I compare the simulated height of new enrollees in 1992 to non-enrollees who report being unable to work because of a musculoskeletal condition in 1983. If height among the latter group reflects the average height of new enrollees and non-induced, non-enrollees in 1992; and the simulated height of new enrollees in 1992 is greater than height among non-enrollees in 1983; then the new enrollees in 1992 are likely taller than non-enrollees in 1992. According to the data, the average height in 1983 for male non-enrollees aged 30 to 49 and 50 to 64 was 178.4 (standard error: 0.43) and 176.2 (standard error: 0.39) centimeters, respectively. These heights are similar to the simulated heights of new enrollees in 1992, again suggesting no substantial height difference between those effectively targeted by the Act and those who, by 1992, were not.

V. Analysis of Labor Supply and Self-Reported Work Limitations by Height

A. Model

[11] See Benetiz-Silva, Buchinsky, and Rust (2004) for an empirical analysis of biases in self-reported health status. Bound (1991) analyzes self-reported versus objective measures of health.

If the Act expanded SSDI rolls to included taller males, then, under certain assumptions, the effect of increased SSDI generosity on labor supply can be measured. I model the structural effect of SSDI receipt on labor supply using the following equation:

$$L = \beta_0 + \beta_1 X + F(h) + \beta_2 M(X, h) + u.$$

In this model, L is the labor market outcome; X is a vector of individual characteristics; $F(h)$ is a function of height (h) which, conditional on X, may proxy for health; $M(X, h)$ is an indicator of Medicare enrollment as a proxy for SSDI benefit receipt; and u is the structural error term. Since eligibility for SSDI benefits is determined by work opportunities and health status, Medicare enrollment is a function of both X and h.

The empirical difficulty of measuring the effect of SSDI receipt on labor market outcomes, represented by the coefficient β_2, arises since $M(.)$ is determined by both X and h, which themselves independently affect labor market outcomes. Therefore, using cross-sectional methods, β_2 would be identified solely from nonlinearities of $M(X, h)$ with respect to X and $F(h)$; for example, if SSDI receipt were modeled as,

$$M(X, h) = \gamma_0 + \gamma_1 X + G(h) + \mu,$$

then β_2 is only identified by variation in μ and differences in $F(h)$ and $G(h)$. Since μ may be correlated with u, and $F(h)$ and $G(h)$ are not known, cross-sectional estimates of β_2 would be difficult to defend.

As an alternative identification strategy, I exploit the fact that the Act targeted males by height. In the context of the model, the Act affected SSDI receipt by manipulating the function $G(h)$. Conceptually, $G(h)$ may be a discrete function of height since, given a fixed budget, the government may target individuals in poorest health. An expansion to the program would therefore increase the height threshold that determines the targeted and non-targeted population. Those most affected by the expansion would be taller than the former threshold but shorter than the new threshold; individuals just below the old threshold and above the new threshold would arguably not be affected by the reform. Under this framework, the effect of expanded SSDI benefits on labor supply can be modeled as:

$$L_t = \beta_{0t} + \beta_1 X + F(h) + \beta_2 M_t(X,h) + u_t,$$

where,

$$M_t(X,h) = \gamma_{0t} + \gamma_1 X + G(h) + \delta R_t(h) + \mu_t.$$

In the Medicare equation, $R_t(h)$ is an indicator that equals one if the individual is observed in the post-Act period and his height falls within the height range targeted by the policy.

If $R_t(h)$ is associated with increased Medicare receipt and satisfies the exclusion restriction (that R_t and u_t are uncorrelated), then $R_t(h)$ serves an instrument for Medicare receipt and β_2 is identified. The exclusion restriction requires that, condition on X and $F(h)$, the targeted height range is associated with labor supply only through the effect of increased benefit receipt. I pursue this empirical strategy in the next subsections.

A. Medicare Receipt

I begin by graphically examining the change in Medicare receipt by height. Plots of the Medicare receipt rate across ten height categories are presented in **Figure 1**.[12] Panel A corresponds to males aged 30 to 49, and Panel B corresponds to males aged 50 to 64. As shown, among younger males, Medicare receipt decreased at the extreme ends of the height distribution and increased at the center. Further inspection of the data reveals that the increase at the center

[12] The discreteness of the height categories reflects the values that the NHIS reports this variable. The height definitions reported in this study reflects the floor value of reported height in centimeters; so, for example, individuals assigned to the 162 to 165 category contains individuals whose height is greater than or equal to 162 and less than 165. The height categories span more than 99 percent of the sample, and the distribution of height does not change between 1983 and 1992 (not shown).

is largely driven by enrollees with musculoskeletal conditions, whereas the change at the extreme ends of the height distribution is not (not shown).

Among older males, Medicare receipt increased at the extreme ends of the height distribution, but there was no noticeable change near the center. Further inspection of the data reveals that the percent of enrollees with musculoskeletal conditions increased near the center of the distribution, but, on net, overall rates of receipt did not change. This is consistent with the results from section III: older males assigned as musculoskeletal after the Act would have been awarded benefits and assigned as something else in the absence of the Act.

Since Medicare receipt did not increase substantially among males aged 50 to 64, the proceeding analysis focuses on younger males only. And since the change in Medicare receipt at the extreme ends of the height distribution are unrelated to the Act, I focus on the seven height categories between 162 and 195 centimeters. Demographic characteristics and Medicare receipt rates for these height categories are presented in **Table 7**. As shown, height is correlated with education, race, and veteran status, but is not strongly correlated with geographic region.

The change in Medicare coverage between 1983 and 1992 is shown in the bottom row of **Table**. As indicated, there is no statistically significant change in Medicare coverage among the two lowest height categories and the highest height category; changes in between range from 0.58 (standard error: 0.16) to 0.72 (standard error: 0.25). Thus, to estimate the model of labor supply described above, $R_t(h)$ equals one for males observed in 1992 between 172 and 190 centimeters tall.

B. Graphical Analysis of Labor Supply and Work-Limitations

Before estimating the labor supply equation, I first examine the changes in labor supply and self-reported work limitations by height. These changes are shown graphically in **Figure 2**.

Panels A and B contain rates of non-labor force participation and employment, respectively. As shown in panel A, the rate of non-labor force participation increased across all height levels, though the increase appears somewhat smaller for the highest height category. However, there is no noticeable change in employment levels for any height category, except for a slight decline in the shortest height category. Taken together, the figures suggest that the effect expanded SSDI benefits on labor force participation, if any, occurs among males who were previously unemployed.

In panels C and D, I plot the percent of males who report being unable to work and being unable to work specifically because of a musculoskeletal condition. As shown in panel C, the percent of males who report being unable to work increased across all height categories, but increased by more among shorter males. This pattern appears robust in panel D when the measure is defined by being unable to work because of a musculoskeletal condition. Thus, the range of heights targeted by the Act, which lies in the middle of the height distribution, does not appear to be associated with an increase in self-reported work limitations. If the relative change self-reported disabilities is a result of the Act (induced-responders), then the difference between simulated height of new enrollees in 1992 and height of non enrollees who are unable to work – presented in **Table 6 –** likely underestimates the difference in heights between new enrollees and non-induced, non-enrollees who are unable to work; in other words, new enrollees are taller than previous enrollees, but perhaps shorter than non-induced responders who were unable to work in 1992.

C. Implied Labor Supply Elasticity

The change in labor force non-participation relative to the change in SSDI receipt across height categories would provide a baseline measure of the effect of SSDI receipt on labor supply.

But since height is correlated with numerous factors that may independently affect labor supply – both cross-sectionally and over time – this baseline measure would provide an inaccurate estimate of the effect of SSDI benefits on labor supply.

I therefore begin by estimating the first-stage and reduced-form equations implied by the system of equations described above. More specifically, I estimate the following equation:

$$Y = \rho_{0t} + \rho_1 X + D(H) + \theta R_t(h) + \epsilon.$$

Y is one of three outcome variables: indicators for Medicare receipt, labor force non-participation, and employment. The function $D(H)$ - representing $F(h)$ and $G(h)$ - is modeled with dummy variables for six of the seven height categories. The vector X includes indicator variables for observed characteristics: education (high school or less), race (white), veteran status (veteran), and geographic region (Midwest, South, and West). And again, $R_t(h)$ equals one for individuals observed in the post period whose height falls within the targeted range (172 to 190 centimeters) and equals zero otherwise.

The estimated coefficients are presented in columns 1, 3, and 5 of **Table 8** for Medicare, labor force non-participation, and employment, respectively. Estimates of θ are reported in the top row. As shown, the targeted height range is associated with a 0.64 percentage point increase in Medicare receipt between 1983 and 1992. Medicare receipt generally decreases with height, as expected, and is positively associated with low education, being non-white, and living in the South. Shown in column (3), the targeted range is also associated with a considerable increase in labor force non-participation, increasing by 1.6 percentage points by 1992; and, similar to Medicare receipt, labor force non-participation is positively associated with low education, being non-white, and living in the South. In column (5), the targeted range is associated with a 0.43 percentage point decline in employment, but the coefficient is not statistically significant.

Together, the coefficients on the target range indicator suggest large labor disincentive effects of SSDI benefits. The instrumental variable estimates for labor force non-participation and employment are reported in columns 1 and 3 of **Table 9**, respectively. As shown, a one percentage point increase in SSDI receipt leads to a 2.5 percentage point increase in labor force non-participation and a 0.68 percentage point decrease in employment. The estimate for labor force non-participation is substantially higher than previous estimates (Parsons 1980 and Slade 1984) and is likely overstated. An obvious concern is that declining real wages among low skilled workers may have increased labor force non-participation and decreased employment independent of the Act (Juhn 1992; Juhn, Murphy, and Topel 1991). If so, and if these changes differentially affected males in the targeted height range, then the estimated impact of the Act on labor force non-participation and employment reported in columns 3 and 5 of **Table 8** would be overstated.

To control for relative changes in labor supply independent of the Act, I re-estimate the equations allowing the effects of the characteristics in vector X to vary with time. This more flexible specification would control for relative changes in labor supply that are unrelated to the Act to the extent that these characteristics and independent changes in labor supply are related. The first-stage and reduced-form estimates using this more flexible specification are reported in columns 2, 4, and 6 of **Table 8**. As shown, the increase in Medicare receipt among males in the targeted height range is robust to allowing the effects of X to vary over time: the coefficient declines from 0.64 to 0.57 and remains statistically significant. However, the same coefficient for labor force non-participation declines from 1.6 to 0.27, and the coefficient for employment increases from -0.43 to -.06. Thus, it appears that the relative change in labor supply among males in the targeted height range can be largely explained by time-varying effects of basic demographic characteristics. As a result, the instrumental variable estimates of the effect of SSDI benefits on labor supply diminish. The estimates, reported in columns 2 and 4 of **Table 9**, imply that a one percentage point increase in SSDI receipt leads to a 0.48 percentage point increase in labor force non-participation and a 0.11 percentage point decline in employment.

The magnitude change of the estimates suggests that the rise in labor force non-participation and decline in employment associated with expansions to SSDI likely reflect changes to the labor market rather than the causal impact of SSDI benefits. The effect of labor market shocks on SSDI receipt has been previously documented elsewhere (Autor and Duggan, 2003; Duggan and Imberman, 2008; Black, Daniel, and Sanders 2002; and Rupp and Stapleton). Whether the estimates reflect the causal impact of SSDI benefits on labor supply remains unclear, however, since there are many other factors - in addition to those contained in the NHIS - that ideally would be controlled. Nonetheless, the decline in the labor force non-participation effect from 2.5 to 0.48 by the inclusion of basic demographic information likely indicates that 0.48 is an upper bound of the true effect. Similarly, the effect of a one percentage point increase in SSDI benefits on employment among young males is at most -0.11 percentage points in absolute value.

Relative to previous studies, the estimated effect of SSDI benefits on employment is most comparable to that of Bound (1989). In his study, he measures the upper-bound effect of SSDI benefit receipt on employment by the employment rate of rejected SSDI applications. Using the Survey of Disability and Work, he finds that, among males rejected for SSDI benefits at ages 45 to 54 years old, the percent employed following rejection ranged from 36.7 to 48.9, depending on the survey year. These upper-bound estimates may be even larger when estimated among males 30 to 49 – the sample considered in this study – since younger males exhibit greater labor supply than older males following SSDI rejection (Bound 1989; von Wachter, Song, and Manchester 2009).

The difference in estimates may reflect that the empirical strategy considered in this study differs fundamentally from Bound's. In Bound's study, the effect is measured from all rejected applicants, whereas, here, the estimate measures the effect of SSDI benefits on employment among those affected by the policy (Angrist, Imbens, and Rubin 1996; Heckman, 1997; Kling 2001). Thus, the estimates taken together suggest that the marginal SSDI beneficiary has lower employment prospects than the average rejected SSDI applicant.

VI. Concluding Discussion

A significant proportion of the rise in SSDI rolls since 1984 has been attributed to the Social Security Disability Benefits Reform Act, yet few studies systematically examine whom the Act effectively targeted. I show that the rise in SSDI receipt for musculoskeletal conditions after the Act likely overstates the impact of the Act among older males and underestimates it among younger males. Additionally, the target population appears to have been in better health and socioeconomic circumstances, as evidenced by height, compared to previous enrollees. Finally, the Act targeted young males who would have had low labor supply in the absence of the policy.

This study makes an important contribution to the broader understanding of the labor supply effects of SSDI benefits. Several studies have documented a simultaneous increase in labor force participation non-participation and SSDI receipt (Leonard1979, and Parsons 1980), suggesting that SSDI benefits have substantial effects on labor supply behavior. However, equivocating SSDI receipt with a behavioral response is misleading since those who are induced out of the labor by SSDI benefits may not otherwise work (Bound and Burkhauser 1999). Indeed, Bound and Waidman (1992) find that males induced from the labor market do suffer from work limitations. If the upper bound effects of SSDI benefits on labor force non-participation and employment from this study are taken as the true effects, then more than two-thirds of young males induced out of the labor market as a result of the Act of 1984 would have otherwise been unemployed.

Appendix Table A

Prevalence of "Main" Disability among Males with "Any" Musculoskeletal - Medicare Enrollees

	All 1983-1986		New "Main" Musculoskeletal 1992-1996		All 1992-1996		Change in Share 1992-1996	
	50-59	60-64	50-59	60-64	50-59	60-64	50-59	60-64
Percent of Population	1.5	3.5	1.9	4.0	1.9	4.0	-	-
Main Disability								
Musculosketal	58.1	62.0	66.9	66.7	69.8	70.5	2.9	3.8
Circulatory	15.0	18.6	11.8	16.3	12.4	12.5	0.52	-3.8
Other	26.9	19.4	21.3	17.0	17.8	17.0	-3.5	-0.04
Observations	155	163	-	-	358	319	-	-

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details.

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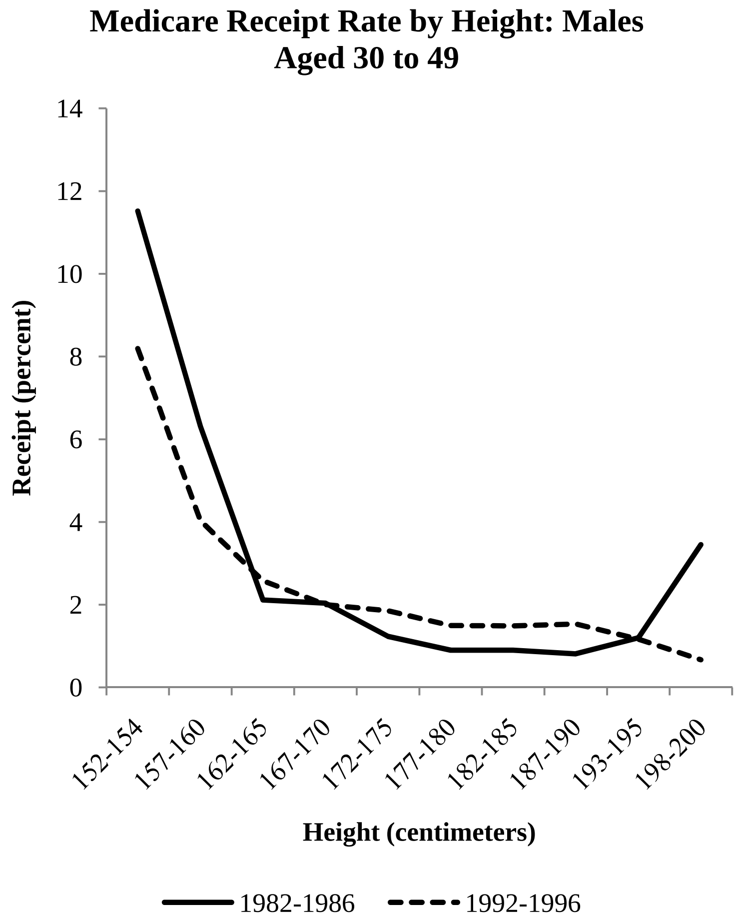
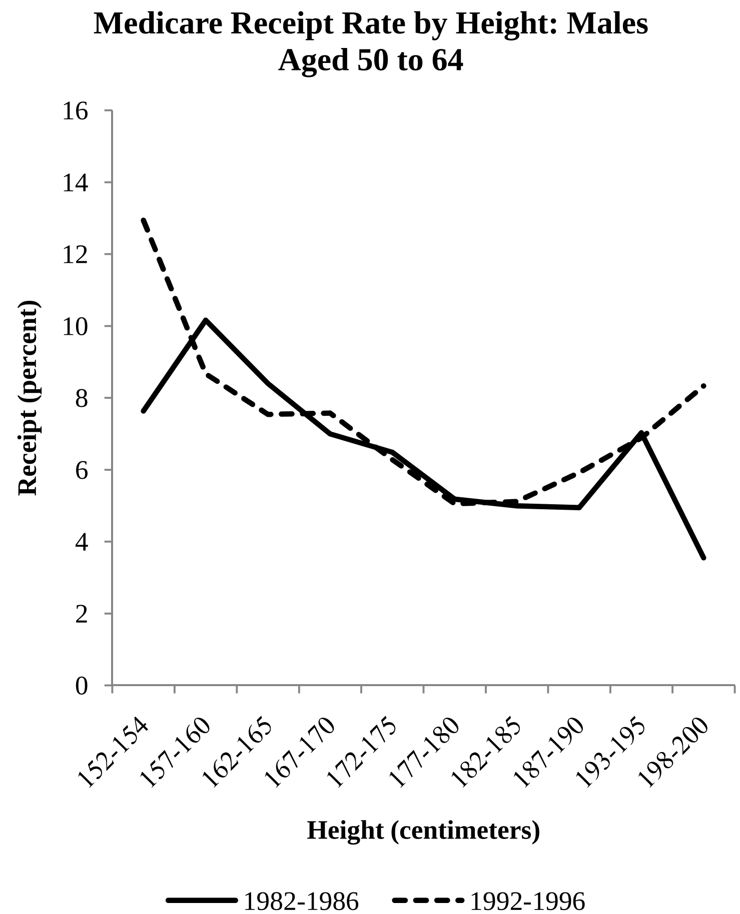
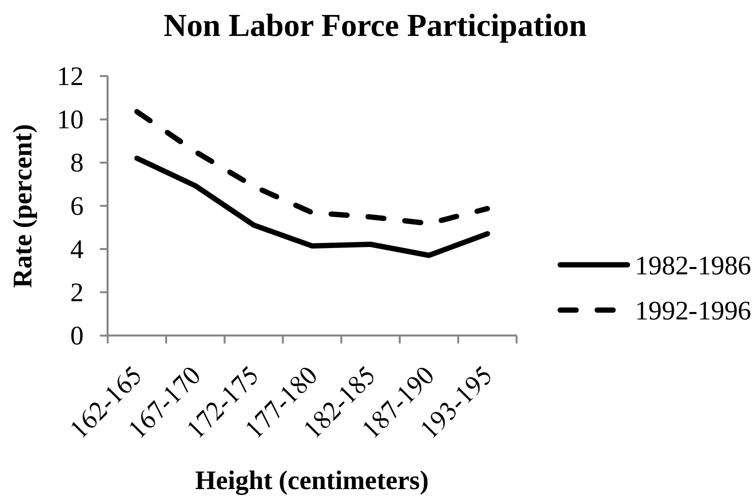


(A)



(B)

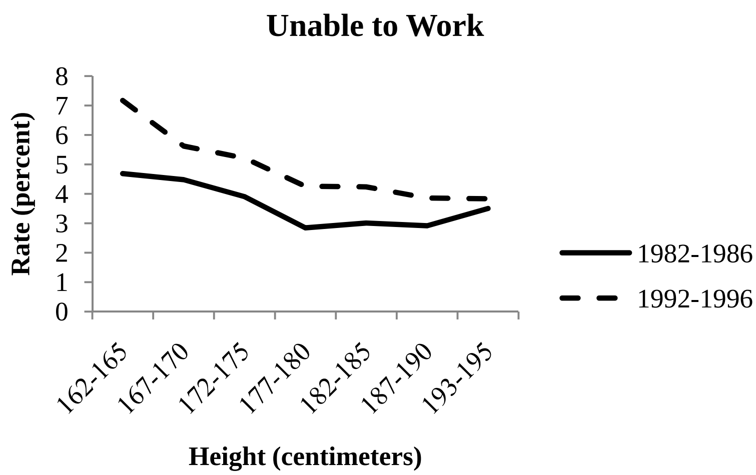
Figure 1: Medicare Receipt Rate among Males by Height and Age



(A)

(B)

Figure 2: Labor Supply and Self-Report Limitation Status among Males Aged 30 to 49



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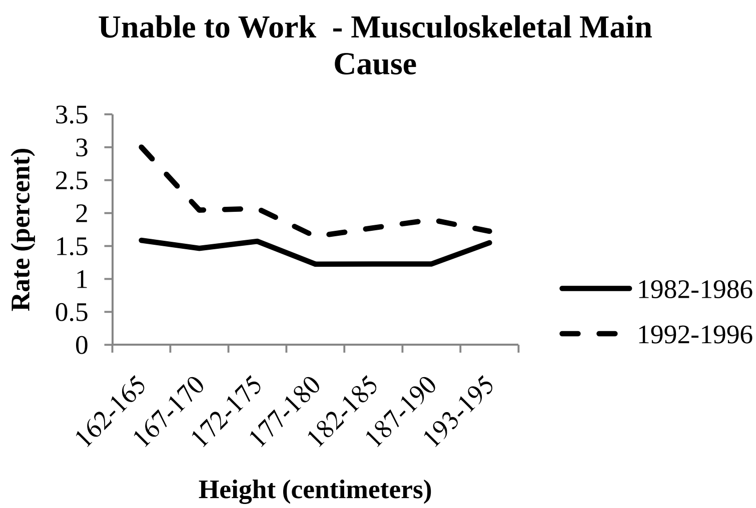

(D)

Figure 2 (continued): Labor Supply and Self-Report Limitation Status among Males Aged 30 to 49

Table 1

Rate of SSDI and Medicare Receipt among Males

	SSDI Receipt			Medicare Receipt		
	1986	1993	Change	1983-1986	1992-1996	Change
Age						
30-39	1.27	1.72	0.45	1.02	1.41	0.39
40-49	2.30	3.15	0.84	1.74	2.31	0.57
50-59	5.73	6.48	0.75	4.16	4.49	0.34
60-64	11.73	11.62	-0.11	9.99	9.91	-0.08

Note: SSDI receipt rates are author's tabulations using figures from Ferron (1995) and US Census data. The numerator for SSDI receipt rate corresponds to December of the figure year; the denominator is based on the US civilian population in January in the year following the figure year. The prevalence of Medicare receipt is calculated using the National Health Interview Survey. Sampling weights - rescaled to sum within sample year to equal the sample size - were used.

Table 2

Rate of SSDI and Medicare Receipt among Males by Type of "Main" Work Disability

	SSDI Receipt			Medicare Receipt		
	1986	1993	Change	1983-1986	1992-1996	Change
A. Musculoskeletal						
Age						
30-39	0.09	0.19	0.09	0.16	0.27	0.11
40-49	0.34	0.49	0.15	0.32	0.62	0.30
50-59	0.95	1.53	0.58	0.87	1.32	0.45
60-64	2.21	2.85	0.63	2.17	2.81	0.64
B. Circulatory						
Age						
30-39	0.05	0.05	0.00	0.06	0.06	0.00
40-49	0.27	0.24	-0.02	0.30	0.22	-0.08
50-59	1.49	1.33	-0.17	1.27	0.99	-0.28
60-64	3.73	3.33	-0.39	2.99	2.46	-0.52
C. Mental Illness						
Age						
30-39	0.45	0.66	0.20	0.25	0.40	0.15
40-49	0.56	1.02	0.47	0.28	0.46	0.18
50-59	0.81	1.11	0.30	0.30	0.30	0.00
60-64	1.11	1.30	0.20	0.25	0.25	0.01
D. Other						
Age						
30-39	0.68	0.83	0.15	0.40	0.47	0.07
40-49	1.14	1.39	0.25	0.59	0.69	0.10
50-59	2.47	2.52	0.04	1.34	1.49	0.16
60-64	4.69	4.13	-0.55	2.84	2.52	-0.32

Note: SSDI receipt rates are author's tabulations using figures from Ferron (1995) and US Census data. The numerator for SSDI receipt rate corresponds to December of the figure year; the denominator is based on the US civilian population in January in the year following the figure year. The prevalence of Medicare receipt is calculated using the National Health Interview Survey. Work-limited individuals who do not report their "main" condition were dropped from the sample. Sampling weights - rescaled to sum within sample year to equal the sample size - were used.

Table 3

Prevalence of Disabilities among Males with "Any" Musculoskeletal - Medicare Enrollees

	1983-1986				1992-1996				Simulated New Medicare Enrollees 1992-1996			
	30-39	40-49	50-59	60-64	30-39	40-49	50-59	60-64	30-39	40-49	50-59	60-64
Percent of Population												
Any	0.23	0.49	1.5	3.5	0.37	0.82	1.9	4.0	0.14	0.33	0.40	0.50
Main	0.09	0.34	0.95	2.2	0.19	0.49	1.5	2.8				
Main Disability												
Musculoskeletal	70.4	65.4	58.1	62.0	74.1	75.7	69.8	70.5	80.1	90.8	114.1	130.8
Circulatory	2.8	6.9	15.0	18.6	0.7	4.3	12.4	12.5	-2.5	0.6	2.5	-30.4
Other	26.8	27.8	26.9	19.4	25.1	19.9	17.8	17.0	22.4	8.6	-16.6	-0.4
Any Disability												
Circulatory	8.5	23.0	36.3	36.1	7.3	16.7	32.2	38.2	5.4	7.6	16.7	53.1
Other	60.4	71.0	76.9	70.7	64.5	64.1	74.6	71.3	70.9	54.2	66.1	75.6
Observations	38	53	155	163	114	244	358	319	-	-	-	-

Note: Figures are calculated using the National Health Interview Survey. Work-limited individuals who do not report their "main" condition were dropped from the sample. Sampling weights - rescaled to sum within sample year to equal the sample size - were used.

Table 4

Characteristics of Medicare Enrollees with "Main" Musculoskeletal

	1983-1986		1992-1996		Change	
	30-49	50-64	30-49	50-64	30-49	50-64
Percent of Population	0.13	0.77	0.36	1.45	-	-
Demographics						
White	78.6	80.8	77.9	80.6	-0.70	-0.23
	(5.3)	(2.9)	(2.5)	(1.8)	(6.1)	(2.9)
High School or Less	82.0	87.2	76.9	88.6	-5.1	1.4
	(5.0)	(2.5)	(2.6)	(1.5)	(5.6)	(2.5)
Northeast	11.2	19.5	19.0	13.5	7.8	-6.0
	(4.1)	(2.9)	(2.4)	(1.6)	(5.0)	(2.9)*
Midwest	15.7	18.2	23.9	21.2	8.2	2.9
	(4.7)	(2.8)	(2.6)	(1.9)	(5.5)	(2.8)
South	53.3	44.4	44.5	46.2	-8.8	1.8
	(6.5)	(3.7)	(3.0)	(2.3)	(7.5)	(3.7)
West	19.9	17.9	12.6	19.1	-7.2	1.2
	(5.2)	(2.8)	(2.0)	(1.8)	(5.9)	(2.8)
Height (centimeters)	174.3	175.2	177.1	176.9	2.8	1.7
	(0.96)	(0.62)	(0.63)	(0.38)	(1.1)*	(0.62)*
Observations	60	186	270	474	-	-

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. Height figure excludes some observations that do not report this value. Standard errors are in parentheses. * Indicates statistical significance at the 5 percent level, reported only for the change estimates.

Table 5

Change in Average Height among Medicare Enrollees by "Main" Disability Relative to All

	"Main" Musculoskeletal					
	Age 30 to 49			Age 50 to 64		
	1983-1986	1992-1996	Difference	1983-1986	1992-1996	Difference
Medicare	174.3	177.1	2.76	175.2	176.9	1.70
	(0.96)	(0.63)	(1.2)*	(0.62)	(0.38)	(0.73)*
All	178.1	178.1	0.09	176.8	177.4	0.52
	(0.036)	(0.029)	(0.046)	(0.047)	(0.042)	(0.063)*
Difference	3.72	1.04		1.69	0.52	
	(0.96)*	(0.63)		(0.63)	(0.38)	
Diff-in-Diffs		2.68			1.18	
		(1.2)*			(0.73)	

	"Main" Other Excluding "Any" Musculoskeletal					
	Age 30 to 49			Age 50 to 64		
	1983-1986	1992-1996	Difference	1983-1986	1992-1996	Difference
Medicare	174.4	174.9	0.55	175.7	176.1	0.42
	(0.82)	(0.45)	(0.93)	(0.53)	(0.37)	(0.65)
All	178.1	178.1	0.09	176.8	177.4	0.52
	(0.036)	(0.029)	(0.046)	(0.047)	(0.042)	(0.063)*
Difference	3.68	3.22		1.17	1.28	
	(0.82)*	(0.45)*		(0.53)*	(0.37)*	
Diff-in-Diffs		0.46			-0.10	
		(0.94)			(0.65)	

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. Height figure excludes some observations that do not report this value. Standard errors are in parentheses. * Indicates statistical significance at the 5 percent level, reported only for the difference estimates.

Table 6

Height among Males with "Main" Musculoskeletal

	Medicare Enrollees				Predicted Previous Medicare Enrollees		Simulated New Medicare Enrollees		Non-Medicare Enrollees Unable to Work	
	1983-1986		1992-1996		1992-1996		1992-1996		1992-1996	
	30-49	50-64	30-49	50-64	30-49	50-64	30-49	50-64	30-49	50-64
Percent of Population	0.13	0.77	0.36	1.45	0.13	0.77	0.22	0.68	1.28	2.20
Height	174.3	175.2	177.1	176.9	174.4	175.7	178.7	178.2	177.3	176.7
	(0.96)	(0.62)	(0.38)	(0.63)	(0.48)	(0.34)	(0.97)	(1.53)	(0.27)	(0.29)
Observations	60	186	270	474	-	-	-	-	996	739

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. Height figure excludes some observations that do not report this value. Standard errors are in parentheses.

Table 7

Characteristics by Height Category: Males Aged 30 to 49

Height	162-165	167-170	172-175	177-180	182-185	187-190	193-195
High School or Less	64.7	58.7	52.1	45.1	44.5	42.9	37.3
	(0.73)	(0.45)	(0.37)	(0.33)	(0.35)	(0.55)	(1.0)
White	65.1	75.2	82.3	87.9	88.4	86.6	87.0
	(0.73)	(0.40)	(0.28)	(0.22)	(0.23)	(0.38)	(0.72)
Veteran	18.5	25.3	29.0	29.9	28.9	28.3	27.3
	(0.60)	(0.40)	(0.34)	(0.31)	(0.32)	(0.50)	(0.96)
Northeast	23.1	22.3	21.2	21.5	19.2	17.5	16.9
	(0.65)	(0.38)	(0.30)	(0.28)	(0.28)	(0.42)	(0.80)
Midwest	17.4	21.8	24.9	25.4	26.5	27.1	26.5
	(0.58)	(0.38)	(0.32)	(0.29)	(0.31)	(0.49)	(0.95)
South	32.0	32.9	32.6	31.8	33.8	34.1	33.1
	(0.72)	(0.43)	(0.35)	(0.31)	(0.34)	(0.53)	(1.0)
West	27.4	23.0	21.3	21.2	20.6	21.3	23.5
	(0.69)	(0.39)	(0.30)	(0.27)	(0.29)	(0.45)	(0.91)
Medicare							
1983-1986	2.1	2.0	1.2	0.9	0.9	0.8	1.2
	(0.42)	(0.24)	(0.15)	(0.11)	(0.12)	(0.19)	(0.44)
1992-1996	2.6	2.0	1.9	1.5	1.5	1.5	1.2
	(0.29)	(0.15)	(0.12)	(0.10)	(0.10)	(0.16)	(0.27)
Change	0.46	-0.03	0.62	0.60	0.58	0.72	-0.03
	(0.51)	(0.28)	(0.19)	(0.15)	(0.16)	(0.25)	(0.52)
Range	No	No	Yes	Yes	Yes	Yes	No
Observations	4241	11772	18334	22208	19653	8096	2177

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. The sample is restricted to those with Medicare and height information. Standard errors are in parentheses.

Table 8

Linear Probability Estimates

	Medicare		NLFP		Employment	
	(1)	(2)	(3)	(4)	(5)	(6)
Range*Post	0.64	0.57	1.6	0.27	-0.43	-0.06
	(0.09)**	(0.26)*	(0.19)**	(0.49)	(0.25)	(0.61)
Height: 167-170	-0.31	-0.3	-0.86	-0.83	0.76	0.76
	(0.29)	(0.29)	(0.55)	(0.55)	(0.66)	(0.66)
Height: 172-175	-0.97	-0.92	-2.9	-2.0	2.2	2.0
	(0.28)**	(0.31)**	(0.54)**	(0.61)**	(0.65)**	(0.75)**
Height: 177-180	-1.2	-1.1	-3.4	-2.5	2.9	2.7
	(0.27)**	(0.31)**	(0.53)**	(0.6)**	(0.63)**	(0.74)**
Height: 182-185	-1.2	-1.2	-3.5	-2.5	2.8	2.5
	(0.27)**	(0.31)**	(0.53)**	(0.6)**	(0.64)**	(0.75)**
Height: 187-190	-1.2	-1.1	-3.9	-2.9	3.5	3.3
	(0.29)**	(0.33)**	(0.56)**	(0.63)**	(0.69)**	(0.79)**
Height: 193-195	-0.78	-0.78	-1.7	-1.7	2.5	2.5
	(0.36)*	(0.36)*	(0.71)*	(0.71)*	(0.85)**	(0.85)**
High School or Less	1.5	1.1	4.8	3.6	-7.4	-6.9
	(0.09)**	(0.13)**	(0.17)**	(0.27)**	(0.21)**	(0.37)**
White	-0.38	-0.23	-5.3	-4.6	7.3	7.8
	(0.14)**	(0.23)	(0.3)**	(0.53)**	(0.36)**	(0.69)**
Veteran	-0.13	-0.44	0.43	-0.3	-0.59	0.57
	(0.1)	(0.13)**	(0.19)*	(0.27)	(0.24)*	(0.37)
Midwest	0.09	0.05	-0.56	0.48	0.77	-1.49
	(0.12)	(0.19)	(0.23)*	(0.37)	(0.3)*	(0.52)**
South	0.64	0.37	0.53	1.01	0.27	-0.84
	(0.12)**	(0.19)*	(0.24)*	(0.36)**	(0.29)	(0.5)
West	-0.09	0.12	1.1	1.9	-1.6	-2.2
	(0.12)	(0.2)	(0.26)**	(0.42)**	(0.33)**	(0.56)**
Post Interactions	No	Yes	No	Yes	No	Yes
Observations	86481	86481	86481	86481	86481	86481
R-Square	0.01	0.01	0.02	0.02	0.03	0.03

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. The sample is restricted to those with Medicare and height information. Robust standard errors are in parentheses. * and ** indicate significance at the five and one percent level , respectively.

Table 9

Instrumental Variable Estimates

	NLFP		Employment	
	(1)	(2)	(3)	(4)
Medicare	2.5	0.48	-0.68	-0.11
	(0.37)**	(0.79)	(0.37)	(1.1)
Observations	86481	86481	86481	86481

Note: Figures are calculated using the National Health Interview Survey. See Table 3 for details. The sample is restricted to those with Medicare and height information. Robust standard errors are in parentheses. * and ** indicate significance at the five and one percent level , respectively.